## WHAT IS CLAIMED IS:

1. A light-emitting device using gallium nitride compound semiconductor comprising:

an emission layer with a multi quantum-well (MQW) structure, in which a barrier layer and a well layer are formed alternately; wherein said barrier layer is made of  $Al_xGa_{1-x}N$  (0<x $\leq$ 0.18).

- 2. A light-emitting device using gallium nitride compound semiconductor according to claim 1, wherein said well layer is made of  $In_yGa_{1-y}N$  (0<y $\leq$ 0.1).
- 3. A light-emitting device using gallium nitride compound semiconductor according to claim 1, wherein said barrier layer has a thickness from 2 nm to 10 nm.
- 4. A light-emitting device using gallium nitride compound semiconductor according to claim 1, wherein said barrier layer has a thickness from 3 nm to 8 nm.
- 5. A light-emitting device using gallium nitride compound semiconductor according to claim 1, wherein a luminous wavelength is in the ultraviolet rays region.
- 6. A light-emitting device using gallium nitride compound semiconductor comprising:

an emission layer with a multi quantum-well (MQW)

structure, in which a barrier layer and a well layer are formed alternately; and

an n-layer made of an impurity-doped  $Al_xGa_{1-x}N$  (0<x $\leq$ 0.06).

- 7. A light-emitting device using gallium nitride compound semiconductor according to claim 6, wherein a strain relaxation layer made of  $In_yGa_{1-y}N$  (0.02 $\leq y \leq 0.04$ ) is formed between said n-layer and said emission layer.
- 8. A light-emitting device using gallium nitride compound semiconductor according to claim 6, wherein said n-layer has a thickness from 50 nm to 300 nm.
- 9. A light-emitting device using gallium nitride compound semiconductor according to claim 6, wherein said n-layer has a thickness from 150 nm to 250 nm.
- 10. A light-emitting device using gallium nitride compound semiconductor according to claim 6, wherein a luminous wavelength is in the ultraviolet rays range.
- 11. A light-emitting device using gallium nitride compound semiconductor comprising:

an emission layer with a multi quantum-well (MQW) structure, in which a barrier layer and a well layer are formed alternately;

a p-layer; and
an n-layer;

wherein said emission layer is sandwiched by said player and said n-layer, and wherein a ratio of an electron concentration of said n-layer to a hole concentration of said p-layer (electron/hole) is from 0.5 to 2.0.

12. A light-emitting device using gallium nitride compound semiconductor comprising:

an emission layer with a multi quantum-well (MQW) structure, in which a barrier layer and a well layer are formed alternately;

a p-layer; and
an n-layer;

wherein said emission layer is sandwiched by said player and said n-layer, and wherein a ratio of an electron concentration of said n-layer to a hole concentration of said n-layer (electron/hole) is from 0.7 to 1.43.

13. A light-emitting device using gallium nitride compound semiconductor comprising:

an emission layer with a multi quantum-well (MQW) structure, in which a barrier layer and a well layer are formed alternately;

a p-layer; and

an n-layer;

wherein said emission layer is sandwiched by said p-

layer and said n-layer, and wherein a ratio of an electron concentration of said n-layer to a hole concentration of said n-layer (electron/hole) is from 0.8 to 1.25.

- 14. A light-emitting device using gallium nitride compound semiconductor according to claim 11, wherein a luminous wavelength is in the ultraviolet rays range.
- 15. A light-emitting device using gallium nitride compound semiconductor according to claim 1, further comprising:
  - a substrate; and
  - a buffer layer formed on said substrate.
- 16. A light-emitting device using gallium nitride compound semiconductor according to claim 15, wherein said buffer layer is formed at a temperature of 1000  $^{\circ}$ C to 1180  $^{\circ}$ C.
- 17. A light-emitting device using gallium nitride compound semiconductor according to claim 15, wherein said buffer layer has a thickness of 0.01  $\mu m$  to 3.2  $\mu m$ .
- 18. A light-emitting device using gallium nitride compound semiconductor according to claim 15, wherein said buffer layer is formed by a physical vapor deposit such as sputtering, ion plating, laser abration, ECR, etc.

- 19. A light-emitting device using gallium nitride compound semiconductor according to claim 18, wherein said buffer layer has a thickness of 100 Å to 3000 Å.
- 20. A light-emitting device using gallium nitride compound semiconductor according to claim 18, wherein said buffer layer is formed at a temperature of 200 °C to 600 °C.
- 21. A light-emitting device using gallium nitride compound semiconductor according to claim 18, wherein said buffer layer is treated by heat treatment at a temperature 1000 °C to 1250 °C.
- 22. A light-emitting device using gallium nitride compound semiconductor according to claim 21, wherein said heat treatment is carried out in an atmosphere of  $\rm H_2$  and  $\rm NH_3$  gases.